REMARKS

Claims 1 through 20 are pending in this application.

SPECIFICATION

Concerning point 3 of the examiner, the examiner stated that the substitute specification filed on 1/11/01 was not entered "because it does not conform to 37 CFR 1.125(b) because the amendment to the specification is too long. Need substitute to [the] specification." The reply filed on 1/11/01 did not have a substitute specification but line insert and deletions. We assume that because of the length of the specification amendments, a substitute specification is needed. Therefore, a substitute specification has been added. A marked-up copy and a clean form specification has been submitted. Corrections were made to the specification for clarification purposes only and to correct any grammatical errors. The specification was also made to correlate with the drawings and other sections of the specification. No new matter was added.

CLAIM REJECTIONS - 35 U.S.C. § 102

On page 2 of Paper No. 8, claims 1, 4 and 9 were rejected under 35 U.S.C. §102(e) as being anticipated by Clement (US Patent No. 5,726,668).

No claim is anticipated under 35 U.S.C. §102 (b) unless all of the elements are found in exactly the same situation and united in the same way in a single prior art reference. Every element must be literally present, arranged as in the claim. *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226,

9 USPQ2d 1913, 1920 (CAFC 1989). The identical invention must be shown in as complete detail as is contained in the patent claim. *Id.*, "All words in a claim must be considered in judging the patentability of that claim against the prior art." *In re Wilson,* 424 F.2d 1382, 165 USPQ 494, 496 (CCPA 1970), and MPEP 2143.03. "A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference." *Verdegaal Bros. v. Union Oil Co. of California*, 2 USPQ2d 1051, 1053 (Fed. Cir. 1987).

Concerning the examiner's point 6 of claim 1, the examiner states that input devices are disclosed. However, in col. 5, lines18-25 of Clement, it states that the keypads 76, 78, and 80 allow correspondence between the bulb locations on each panel and selected process variable can be input to the GPDP for each panel and for executing system diagnostics. This is not the same as the presently claimed invention that has an "inputting device inputting a display data channel of a monitor into a computer." Clement's correspondence between the bulb locations on each panel and system diagnostics isn not the same as the present invention. Clement uses the keypads in a different manner.

The examiner mentioned a "bulb driver board." However, the bulb driver board is not the same as a driving device for the inputting device. Col 16, lines 59-67 mentions that the driver board drives the bulbs, but not the input device.

The examiner mentions that an interface section is disclosed by Clement. Clement in col. 5, lines 9-17 mentions an I/O interface, however it generally with no specifics mentions digital inputs , outputs, analog inputs and outputs utilized by the process control system 62 to the

manufacturing process equipment and instruments on the plant floor. The variable may also include status variables that relate to the physical status of the process control. In the presently claimed invention, claim 1 mentions of an "interfacing section indicating whether the display data channel of the monitor is inputted into the computer and outputting the same voltage signal as an initial signal, the outputted voltage signal is switched at a different time according to a result of inputting the display data channel;" Clement does not teach specifically an interfacing section that indicates whether the display data channel of a monitor is inputted. Clement only mentions in general every possible type of input signal but does not specifically mentions the limitations of the present invention.

The interface section itself of Clement does not indicate "whether the display data channel of the monitor is inputted into the computer..." as seen in the present invention. This accommodates a user to quickly see the problem right at the connection point. In col. 5, lines 9-17 it only mentions various types of data inputs but no type of indicator.

The examiner mentions that Clement discloses a controller for each of UART channel A and channel B communication path. The UART is a universal asynchronous receiver transmitter. Clement is not exactly disclosing the limitations of the present invention that includes the controller for controlling the driving device that drives the inputting device. The controller of Clement does not determine whether or not the result of inputting the display data channel is correct.

As mentioned above in *Richardson v. Suzuki Motor Co.*, 868 F.2d 1226, 9 USPQ2d 1913, 1920 (CAFC 1989), every element must be literally present, arranged as in the claim. Clearly, Clement does not literally have all the elements as arranged in the claims. Clement only mentions

generally certain inputs and outputs. Clement concerns basically control systems in Chemical manufacturing processes as mentioned in the background in col. 1, lines 13-18. Therefore, it is not surprising, the teaching of Clement are different. A controller, input device, driver, interface, and controller may exist, however, they are connected in the same way, nor are they able to perform the same tasks of the present invention. The standard for 35USC§102 is very high, and clearly Clement does not meet the standard.

Concerning claim 4 (examiner's point 7), the PLD of Clement is not the same as the present invention. The cited section of col. 15, lines 4-6, states that the PLD is programmed to serve as the address decoder and logic decoder for the two channel UART. This is not the same as a PLC that is used for controlling the driving device that drives the inputting device and to determine whether or not the result of the inputting the display channel specifically is correct. In col. 15, lines 14-17 of Clement, it states that each of the LEDs status lights are driven by the PLD. It's the LED that are used to indicate whether data is being received by the UART. Data in general is talked about with specific reference to a universal asynchronous receiver/transmitter. This is not the same as a a display data channel for a monitor.

Concerning claim 9 (examiner's point 8), in Clement on col. 14, lines 19-27, it states that an alarm is turned on if an alarm has been set. Clement clearly does not teach the present invention having the controller raise an alarm when the display data channel is abnormally inputted into the computer. These are limitations that Clement fails to teach. Clement is too general and does not

teach the specifics of the invention as mentioned above in the claim limitations.

REJECTION OF CLAIMS (35 U.S.C. § 103)

On page 3 through 4 of Paper No. 8, claims 2, 3, 5 through 8, 10, 11, and 17 were rejected under 35 U.S.C. §103(a) as being unpatentable.

According to MPEP 706.02(j), the following establishes a *prima facie* case of obviousness under 35 U.S.C. §103:

> To establish a *prima facie* case of obviousness, three basic criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art and not based on applicant's disclosure. In re Vaeck, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

The first point in MPEP 706.02(j) states that there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. "Combining prior art references without evidence of such a suggestion, teaching, or motivation simply takes the inventor's disclosure as a blueprint for piecing together the prior art to defeat patentability. *In re Dembiczak*, 50 USPQ.2d 1614 (Fed. Cir. 1999). The showing must be "clear and particular" without broad generalized

conclusory statements. *Id.* There must be specific statements showing the scope of the suggestion, teaching, or motivation to combine the prior art references. *Id.* at 1000. There must be an explanation to what specific understanding or technical principle would have suggested the combination of references. *Id.*

The mere fact that the teachings of the prior art can be combined or modified does not itself make the resultant *prima facie* obvious. MPEP 2143.01.

Secondly, MPEP 706.02(j) states that there must be a reasonable expectation of success.

The third point in MPEP 706.02(j) states that the prior art reference (or references when combined) must teach or suggest all the claim limitations.

Concerning the examiner's point 9, the examiner rejected claims 2, 3, and 6 under 35 U.S.C. §103(a) as being unpatentable over Clement in view of Anderson et al. (U.S. Patent 6,108,787).

In the examiner's point 10, the examiner states that for claims 2, 3, and 6, Anderson teaches a computer network system including a further port 30 connects the switch means 20 to an information input device 32 including a keyboard, mouse, or a scanner. First of all, Anderson is not of an analogous art. Anderson deals with interconnecting networks of different security levels while the present invention is dealing with inputting and detecting display data channel in manufacturing a monitor. Anderson because it is not analogous with the present invention, cannot be combined with Clement.

The examiner states that Anderson and Clement discloses a system that would "allow the user to select the information data between computer networks having different of display (col. 1,

lines 6-8 of Anderson)." Lines 6-8 of Anderson only mentions that there is a selective input and output of information data between computer networks having different levels of security. Connecting between networks with different levels of security is quite different than checking monitors in the manufacturing of a monitor. Anderson is dealing with local area networks and wide area networks (col. 1, lines 28-29). To set up this kind of link to check a monitor is not needed. In a network as described in Anderson, two sets of computers are needed to allow connection between the two computers. Anderson is teaching away from the present invention that is only used to test a monitor in a manufacturing process. If one had to connect the monitor as proposed by Anderson, the tested monitor would need a CPU device and so would the system checking the monitor. This is far more expensive than the present invention. Furthermore, it is not technically feasible to use a network connection to test a monitor in that the monitor is actually being used by its system. Extensive diagnostics cannot be performed while a computer is hooked to its own processing system. Furthermore, Clement makes no mention about testing a monitor. Clement only mentions a general programmable graphics panel. Therefore, the combination does not teach or suggest a switch to select one of the mouse and the scanner for inputting a display data channel of the monitor into a computer.

Further, the switch means of Anderson 20 mentioned by the examiner in col. 5, lines 47-53, teaches that the switch means is designed to allow the flow of information from the higher classified network workstation keyboard (input device 32) to a lower classified network 12. This is not a switch that selects one of scanner or mouse. The combination of Clement and Anderson do not teach an inputting device that inputs "a display data channel of a monitor into a computer." The

combination do not teach or suggest these specific elements. A scanner and mouse may be mentioned by Anderson, however, Anderson only states that it is an information input device 32 in col. 6, lines 49-54. There is no mention in Anderson that the input device is used for inputting a display data channel of a monitor into a computer. These limitations are specified in the claims and they are not taught or suggested by Anderson or Clement.

In the examiner's point 11, the examiner states that claims 5, 7, 8, 10, 11 and 17 are rejected under 35USC§103(a) as being unpatentable over Clement in view of Merrell et al. (U.S. Patent 4,263,647).

In the examiner's point 12, concerning claim 5 and 7, Merrell does not teach a Zener diode connected with a pin of the display data channel. Merrell does not teach a transistor having a base connected to an output terminal of the Zener diode and being turned-on and off according to the presence of the display data channel. The examiner mentions a switch 200 being the same; however, as mentioned in Merrell in col 14, lines 5-6, reference 200 is a single pole 3 position mode switch which is not a transistor. Furthermore, the 3 position switch is in figure 6 of Merrell, while the Zener diode is in figure 18. These are separate circuits. In brief description of the drawings, it mentions for Merrell, that figure 6 concerns the decoding and control circuit which forms part of the processor while figure 18 concerns the fault monitor line and its connections to the processor in the numerical control system. The transistor is no way shown to be connected to the Zener diode.

Merrell also does not teach or suggest a a relay that is magnetized according to the state of the transistor as seen by the presently claimed invention. In Merrell, the relay coil 574 is not

dependent on the three position switch 200 which analogized to a transistor. In col. 29, lines 24-25, Merrell states that the relay coil is deenergized when the fault monitor line 243 is driven low, but there is not specific mention that it is the switch 200 that does it.

Merrell also does not teach or suggest a relay having 3 relay switches. The relay coil 574 shows only one switch.

Merrell also does not teach or suggest a light emitting diode to emit light when the first relay switch is turned on to identify the inputting of the display data channel. As seen in figure 6, the relay 574 has no connection to the LED. The state of the relay has bearing on the LED 172, 177 as in the present invention, let alone a first relay switch of three to turn on the LED.

Respectfully, to have a group of elements like a Zener diodes, relays, etc in circuits is not enough to show that a circuit is obvious. The connections of the components are important in the electrical properties are quite different. The claims, specifically mention the connections, and those connects are not taught by Merrell or the combination with Clement. Some of the components are actually in entirely separate circuits that are not interrelated in the same way that the present inventions has the circuits.

Concerning the examiner's point 13, as seen in claim 7, the examiner fails to show the combination teaches or suggests that when a continuous high frequency signal is outputted, that there is a determination of an abnormal display data channel if the interfacing section outputs the same signal as the initial signal at a second time. These limitations, respectfully have not been discussed, nor are they taught by the combination of references.

The examiner states that the watch dog timer 170 of figure 6 of Merrell teaches or suggests

a timer to determine a first predetermined time and a second predetermined time. In the present invention in claim 7, the display data channel is determined whether it is abnormal or normal according to high frequency signals according to first predetermined time and a second predetermined time. In Merrell, in col. 25, lines 45-55 as identified by the examiner. In Merrell, it is a first number and second number that is reported indicating an event occurring, not a time duration of a high frequency signal. This does not teach or suggest two predetermined times. In Merrell, it specifically states that these two numbers are used in the table to define what has happened. An event occurring or not does not teach or suggest a time durations. The watch dog timer interrupt service routine 513 does report to the control lines INT6 and INT7 and the interupt service routine 513 does report to the scheduler of the operating system. However, it is not indicated that the between the first number that tells that an even has occurred and the second number that identifies a specific task is a first predetermined time and a second predetermined time of a high frequency signal used to determine the abnormality of a display data channel.

Claim 8 includes a limitation of two time ranges (.750 to 1.5 seconds and 3.5 to 4.5 seconds). This range is teaching how the apparatus of the present invention works. The references of Merrell and Clement do not teach or suggest such a range. The examiner points to col. 25, lines 45-50 of Merrell, which does not teach or suggest such a range. The passage only states that "in no case is a task allowed to execute more than five milliseconds at one time." This shows that the Merrell is not analogous to the present invention in that it is discussing time period of an event and not that the time period is used to determine state of a signal. Furthermore, Merrell, is teaching away from the present invention, in that it is stating that the task cannot be more than 5 milliseconds,

which even though is not related to the present invention, the time period is not within the range of the present invention. The monostable multivibrator 170 mentioned by the examiner as the watch dog timer, is a 70 millisecond monostable multivibrator as mentioned in col. 12, lines 62-64. There is no further information on the one-shot multivibrator. It is true that a one-shot multivibrator may have a sable state from which it can be triggered to change state for the predetermined interval after which it returns to the original state. However, this not what is happening in the present invention. The information given by Merrell does not teach or suggest a first predetermined time and a second predetermined time of a high frequency signal used to determine the abnormality of a display data channel, nor does it teach or suggest the specific ranges time periods of the present invention.

Concerning the examiner's point 14, with respect to claim 10 the examiner states that Merrell teaches a reset switch 581 connected in parallel with the relay contacts 578 and is mounted on the pendent control station 2 (col. 29, lines 20-23). First of all Merrell's reset switch and relay contacts are not a part of the driving device that drives the inputting device as mentioned in claim 1 of the present invention. A person of the ordinary skill in art would not have combined Merrell's teaching with Clement to make such a circuit. Secondly, Merrell and the combination does not teach or suggest a relay switch in parallel connection to a contact point for inputting the display data channel of the inputting device. The reset switch does not teach or suggest a contact point for inputting the display data channel as seen in figure 18 of Merrell.

Concerning the examiner's point 15 with regards to claim 11, the examiner states that Merrell teaches a main processor controlling a relay coil as seen in figure 18. Merrell does not teach or suggest that a relay switch that is turned on to allow the input of the display data channel into the

monitor. The combination makes not mention of such a limitation either. Figure 18 shows a processor and a relay, the dotted lines show that are separated. In col. 29, lines 24-27, it shows that when the fault monitor line 243 is driven low, then the relay coil 574 to 577 are deenergized. Merrell, is opening the circuit so that the signal is stopped until it is reset after correction. Merrell does not teach the specific teaching of the presently claimed invention. Merrell teaches a fault monitor with an emergency stop circuit 572. The present invention is there for detecting the display data channel as in claim 11 , it states when relay coil is on for a predetermined time to input the display data channel. Merrell does not teach that after a predetermined time of turning on the relay that a display data channel is inputted. Merrell, teaches away from this in that when the relay is deenergized the signal no longer passes through and is set for only to be corrected. No time period is set where the relay switch must be on for the input of the data channel to be made to the monitor.

Therefore, in view of foregoing amendments and remarks, the applicant respectfully requests that the examiner withdraw the rejection of claims 1 through 20.

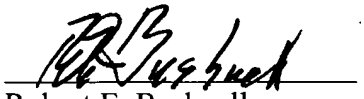
PRIOR ART NOT RELIED UPON

The prior art reference (or references when combined) made of record and relied upon do not teach or suggest all the claim limitations of the present claimed invention. Respectfully, the prior art made of record and not relied upon, do not form a bases for 35 U.S.C. §102 or 35 U.S.C. §103 rejections.

In view of the foregoing amendments and remarks, all claims are deemed to be allowable and this application is believed to be in condition to be passed to issue. If there are any questions, the examiner is asked to contact the applicant's attorney.

A fee of $110.00 is incurred by filing of a petition for one month extension of time. Applicant's check drawn to the order of the Commissioner accompanies this. Should the check become lost or detached from the file, the Commissioner is authorized to charge Deposit Account No. 02-4943 and advise the undersigned attorney accordingly. Also, should the enclosed check be deemed to be deficient or excessive in payment, the Commissioner is authorized to charge or credit our deposit account and notify the undersigned attorney of any such transaction.

Respectfully submitted,



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VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE SPECIFICATION

Applicant respectfully requests entry of the following amendments to the originally filed specification and Abstract for the purpose of preparing a Substitute Specification (and Abstract) for the above-captioned application:

TITLE

APPARATUS FOR INPUTTING AND DETECTING A DISPLAY DATA CHANNEL IN MANUFACTURING A MONITOR

CLAIM OF PRIORITY

This application makes reference to, incorporates the same herein, and claims all benefits accruing under 35 U.S.C. §119 from an application for [*Apparatus For Inputting And Detecting A Display Data Channel In Manufacturing A Monitor*] *Apparatus for Examining DDC Input in Product Line of Monitor* for earlier filed in the Korean Industrial Property Office on the 30th day of March 1998 and there duly assigned Serial No. 1998/10975.

BACKGROUND OF THE INVENTION

Field of the Invention

The present invention relates to the transmission and detection of a display data channel

during the manufacture of a visual monitor, and, more particularly, to an apparatus for enhancing manufacturing productivity while concomitantly reducing unit cost by automatically [input] inputting and detecting a display data channel during the manufacture of monitors.

Description of Background Art

In general, before packaging and shipping, manufacturers occasionally subject video monitors for computers to an operability test by applying and examining the visual display of data during transmission of the data via a display data channel [(hereinafter, sometimes referred to as a DDC)] to each of the monitors. The input of the [DDC] display data channel 22 to each monitor is performed with either a scanner or a mouse, and a computer is used to detect the [DDC] display data channel 22 on the monitor to which the scanner or the mouse is connected, [and] then the monitor to be examined is connected.

Under current practice, a worker operates a scanner or a mouse in order to input the display data channel into the monitor being tested. Each monitor travelling along an assembly line is briefly stopped at a position accessible to a personal computer that serves as a test set. In order to input and detect the [DDC] display data channel 22, the worker either clicks the appropriate button of a mouse or scans the bar coded information from a label (*e.g.*, [for example,] a label bearing the serial number of the monitor) that is being dispensed for application to the rear of the newly manufactured monitor. When the worker clicks the mouse, or alternatively, scans the information from the label, the [DDC] data display channel 22 for the monitor is applied to the personal computer of the test set. When the [DDC] data display channel 22 has been normally input into the personal computer, the personal

computer drives its own monitor to visually display a message indicating that the operation has been successively completed. If the [DDC] data display channel 22 is not input into the personal computer for some reason, the personal computer drives its monitor to display an error message. I have noticed, however, that in order to apply and detect the display data channel for each newly manufactured monitor, the worker must operate a mouse, or a scanner for each test of each newly manufactured monitor. Moreover, I have found that the worker must separately[,] and visually identify the messages which are displayed on the screen of the monitor of a test set personal computer, for each monitor that travels along the assembly line. Furthermore, since the worker must operate the mouse or the scanner while visually identifying each message displayed on the monitor of the test set that corresponds to the input and detection of the [DDC] data display channel 22, a substantial number of man-hours is required during each shift in order to test each newly manufactured monitor.

SUMMARY OF THE INVENTION

It is an object of the present invention to provide an improved apparatus and process for applying and detecting data transmitted to a monitor via a display data channel.

It is another object to provide an improved apparatus and process for automatically applying and detecting data transmitted to a monitor via a display data channel, during the manufacture of the monitor.

It is still another object to provide an apparatus and process able to individually test newly manufactured video monitors while minimizing the number of operational steps required during the

performance of each test.

It is yet another object to provide an apparatus and process able to individually test newly manufactured video monitors while reducing the amount of time required to perform each test.

It is still yet another object to provide an apparatus and process that simplifies the testing of each newly manufactured video monitor.

The present invention has been made to overcome the above described problem of the prior art. It is an object of the present invention to provide an apparatus for [input] inputting and detecting a display data channel [in] while manufacturing a monitor [capable of] and improving [a] the productivity of monitors by automatically [input] inputting and detecting a display data channel of a monitor in manufacturing the monitors, thereby reducing a manufacturing cost of the monitor.

These and other objects may be attained with [apparatus and processes] an apparatus, process, and method for applying and detecting a display data channel through which data for a monitor is transmitted to a computer during the manufacture of a monitor. Embodiments of the present invention contemplate an input device that applies [the] a display data channel for [the] a monitor into [the] a computer; a driver that supplies the input device with predetermined electric signals; an interface that indicates whether the display data channel for the monitor has been applied to the computer, generates the same voltage signal as an initial signal generated by the programmable logic controller, and switches the initial signal at a different time (as shown in FIG. 4) in accordance with [the] a determination about the application of the display data channel; and a programmable logic controller that regulates the mouse/scanner driver by generating [the] a predetermined electric signal, analyzes [the] an output signal from the interface, and determines

whether or not the result obtained by the application of the display data channel is correct.

The input device may [includes] include a mouse, a scanner and a switch to select either the mouse or the scanner, while the controller may be implemented with a programmable logic controller. The interface may be constructed with a Zener diode connected with a pin coupled to the display data channel running between the computer and the [monitor,] monitor; a transistor having a control electrode coupled to an output terminal of the Zener diode and turned-on and turned-off in accordance with the presence of the display data [channel,] channel; a relay including a relay coil magnetized when the transistor is turned-on and first and second relay switches turned-on when the transistor is [turned-off,] turned-off; and a light emitting diode that [emitting] emits light when the first relay switch is turned-on so that the application of the display data channel can be identified. After the display data channel is applied to the computer and the interface outputs a high frequency signal, the controller is able to determine that the display data channel is normally applied to the computer when the interface outputs [the same signal as the initial signal at a first time, and after] a signal within a first time interval. After the interfacing section continues to output the high frequency signal for a predetermined time after the first time interval, the controller determines that the display data channel is abnormally inputted into the computer if the interface outputs the [same] signal [as the initial signal at] up to a second time interval. The first time interval has a range of approximately 750 milliseconds through approximately 1.5 seconds, and the second time interval has a range of approximately 3.5 seconds through approximately 4.5 seconds.

When the display data channel is abnormally applied to the computer, the controller sounds an alarm through a loud speaker. The driver may include a relay switch (as shown in FIG. 5)

coupled in parallel to a contact point for applying the display data channel of the input device and a relay coil that is magnetized by [the] a predetermined electric signal sufficiently to operate the relay switch. After a control and detection signal is supplied to the monitor, the controller magnetizes the relay coil and turns-on the relay switch at a predetermined time so that the display data channel is applied to the monitor.

BRIEF DESCRIPTION OF THE DRAWINGS

A more complete appreciation of the invention, and many of the attendant advantages thereof, will be readily apparent as the same becomes better understood by reference to the following detailed description when considered in conjunction with the accompanying drawings in which like reference symbols indicate the same or similar components, wherein:

FIG. 1 is a schematic view of an apparatus dedicated to the process of determining whether a display data channel is inputted into a monitor in manufacturing monitors;

FIG. 2 is a schematic perspective view of an apparatus that uses a scanner for reading a bar code of a label that is designed to be attached to the back side of each newly manufactured monitor;

FIG. 3 is a schematic view of apparatus for applying and detecting a display data channel applied to newly manufactured monitors in accordance with the principles of the present invention;

[FIG. 4 is a view] FIG. 4A-4C are views showing the waveform of output signals obtained from the input of the display data channel to newly manufactured monitors;

FIG. 5 is a view showing the construction of a circuit that may be used to selectively connect a mouse or a scanner during the practice of the present invention; and

FIG. 6 is a schematic view of a conveyer system dedicated to transporting newly manufactured monitors during fabrication and testing.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Turning now to the drawings, FIG. 1 is a schematic view of an apparatus for inputting and detecting the [DDC] display data channel 22 during the manufacture of video monitors. The input and detection of the [DDC] display data channel 22 using scanner 6 and mouse 7 will be described in detail below. A worker operates scanner 6 or mouse 7 so as to input the display data channel on the newly manufactured monitor 2 that is being tested, and to detect the display data channel on that monitor. The [DDC] display data channel 22 is applied to a monitor 2 by use of mouse 7 while monitor 2 rides upon pallet 60 that is being carried by conveyor belt 51; conveyor belt 51 is stopped at a position that enables personal computer 3 to apply and detect the [DDC] display data channel 22 on the monitor. When monitor 2 is in place and the worker clicks a corresponding button of mouse 7, the [DDC] display data channel 22 for monitor 2 is received by personal computer 3 through an interface board 4. When the [DDC] display data channel 22 has been normally received by personal computer 3, personal computer 3 generates a normal message, for example, a video signal corresponding to a variable visual video display on monitor 1 of the expression OK. When the DDC has been abnormally received by personal computer 3 or when interface board 4 or its cable is not properly connected to personal computer 3, personal computer 3 may generate a video signal that drives monitor 1 to visually display an error message, for example, the word ERROR or the expression NG, on its video screen.

When scanner 6 is used to apply the [DDC] display data channel 22 to monitor 2, pallet 60 is stopped at a position that enables personal computer 3 to receive and detect the [DDC] display data channel 22 for monitor 2. The worker uses scanner 6 to read a bar code from a label that will be attached to a back side of monitor 2. When the worker inputs information corresponding to monitor 2 into personal computer 3 by scanning the bar code from the label for monitor 2, the [DDC] display data channel 22 for monitor 2 is applied to personal computer 3 through interface board 4. When the [DDC] display data channel 22 has been normally received by personal computer 3, personal computer 3 generates a normal message, for example, a video signal corresponding to a variable visual video display on monitor 1 of the expression OK. When the [DDC] display data channel 22 has been abnormally received by personal computer 3 or when interface board 4 or its cable is not properly connected to personal computer 3, personal computer 3 may generate a video signal that drives monitor 1 to visually display an error message, for example, the word ERROR or the expression NG, on its video screen.

FIG. 2 is a perspective view of a device that may be used with scanner 6 to read the bar code from a label to be attached to the back side of monitor 2. The worker holds scanner 6 with one hand and positions scanner 6 to read the bar code from monitor label 13 which is carried by rollers 11 and 12. I have noticed that in order to apply and detect the display data channel to monitor 2 according to this practice, the worker must [operates] operate the mouse, or the scanner each time. Moreover, I have found [that there is another] a disadvantage attributable to the fact that the worker must separately, visually identify the messages which are displayed on the screen of monitor 1 of personal computer 3[,] for each monitor 2 that travels along conveyor belt 51. Furthermore, since the worker

is required to operate mouse 6 and scanner 7, while visually identifying each message displayed on monitor 1 corresponding to the input and detection of the [DDC,] display data channel 22, a substantial quantity of time is required in order to test each monitor 2.

[Hereinafter, apparatus and a process for applying and detecting the display data channel during the manufacture of monitors in the practice of an embodiment of the present invention will be described in detail with reference to the accompanying drawings. The like reference numerals are used for the like elements.]

As shown in FIG. 3, the apparatus according to the embodiment of the present invention contemplates a circuit with a mouse 7 or a [spanner] scanner 6 for inputting a display data channel [(hereinafter, referred to as DDC)] of a monitor 2 into a personal computer 3 which is used for examining the [DDC] display data channel 22 during the manufacture of [monitors, a relay 20 for including] monitors; relay 20 includes switch contacts Rl and R2 which are in parallel connected with input contacts 10a and 10b of the mouse 7 or input contacts [IOA and IOB] 10A and 10B of the scanner 6 and a coil RC which is magnetized by a predetermined electric signal, for example an electric signal (high frequency) outputted from a programming logic controller 100 as described below, and then connects the switch contact Rl to the switch contact R2 so that an electric current is conducted[,] ; an interfacing section 200 for indicating that the [DDC] display data channel 22 of the monitor 2 is inputted into the computer 3 and for outputting an initial signal and the same signal which is switched at a different time as that of generating the initial signal according to a result of inputting the [DDC, and the] display data channel 22; the programming logic controller 100 [(hereinafter, referred to as PLC)] for generating a signal magnetizing the coil RC forming the relay

20 so as to electrically connect the switch contact Rl to the switch contact R2, for enabling the [DDC of the monitor 2 to be inputted into the personal computer 3,] display data channel 22 to be input into the personal computer 3; and for determining whether the inputting of the [DDC] display data channel 22 is normal or abnormal by using [a difference of voltage signals from the interfacing section 200] a determination of the difference of frequencies and switching times between interfacing section 200 and programmable logic controller 100.

As shown in FIG. 3, the interfacing section 200 according to the present invention includes a [zener] Zener diode 201 which is connected with pins of ports 30 and 32 to connect the personal computer 3 to the monitor 2[,] ; a transistor 202 which has a base terminal connected to an output terminal of the [zener] Zener diode 201 and which is turned-on or turned-off based on the presence of the [DDC,] display data channel 22; a relay 210 for including a relay coil 211 magnetized when the transistor 202 is turned-on [and a first] and first and second relay [switch] switches 213 and 215 which are turned-on when the relay coil 211 is not magnetized[,] ; a light emitting diode 220 for emitting light when an electric current is applied to the first switch, i.e. when the [DDC] display data channel 22 is inputted into the monitor 2, so that it is identified to input the [DDC] display data channel 22 into the monitor 2[,] ; and resistors [RI] R1, R2, and R3 for regulating current. When the second switch 215 is turned-on, voltage (-24V) for driving the [PLC] programmable logic controller 100 is applied to the [PLC] programmable logic controller 100.

With respect to [FIG- 3, a reference] FIG. 3, reference numeral 50 indicates a signal supplying device for supplying signals to examine the monitor 2.

Hereinafter, the operation of the apparatus to input and detect the [DDC] display data channel

22 in manufacturing the monitors according to the present [invention. will] invention will be described in detail with reference to FIGs. 3 through 6. When monitor 2 is placed at a position to be examined and adjusted in the facility for producing the monitor 2, the signal supplying device 50 supplies signals for examining and adjusting the monitor 2, for example horizontal synchronization signal and vertical synchronization signal, through a signal cable 55, a microprocessor cable 54, and the like to the monitor 2.

That is, when examining and adjusting the monitor [2.] 2, a worker places a pallet 60 on a conveyer belt 51 and positions the monitor 2 to [he] be examined on the pallet 51. When operating the conveyer belt 51, [then,] the pallet 60 having the monitor 2 thereon is carried by the conveyer belt 51. The pallet 60 is stopped at a position [that] where the signal supplying device 50 is disposed by a [stopper] detent 57 installed at the center portion of the conveyer belt 51.

The microprocessor cable 54 and the signal cable 55 are connected to an assembly of a printed circuit board in the monitor 2 at one [ends] end thereof and is in automatic and manual contact with connecting devices, such as a micro processor jack 58 and a signal jack 59 of the signal supplying device 50 which are fixed to a frame of the conveyer belt 51 at the other ends thereof.

As described above, when the micro processor cable 54 and the signal cable 55 are connected to the connecting devices fixed to the frame of the conveyer belt 51, signals for examining and detecting the monitor [2, for examples] 2 (e.g., the horizontal synchronization signal and the vertical synchronization [signal,] signal) are supplied through the combination cable 56 from the signal supplying device 50 to the assembly of the printed circuit board 2b.

The signals for examining and detecting the monitor 2 are processed in the assembly 2b of

the printed circuit board and indicated on the monitor 2 so that the worker can identify the result of examining and detecting the monitor 2 to adjust the [DOC] display data channel 22 of the monitor 2.

After the signal supplying device 50 supplies the signals for adjusting and examining the monitor 2 for the monitor 2, the [PLC 100 makes] programmable logic controller 100 magnetizes the coil RC of the relay 20 [to be magnetized] and [to turn-on the contacts RI] turns-on contacts R1 and R2. That is, the PLC 100 turns on the relay 20 automatically after the signal supplying device 50 supplies the signals for adjusting and examining the monitor 2 for the monitor 2. Even though the worker [do] did not push a switch button of the mouse 7 or the scanner 6, the PLC 100 can input the [DDC] display data channel 22 into the monitor 2.

As described above, the contacts R1 and R2 of the relay 20 are electrically connected with each other to make the [DDC] display data channel 22 to be inputted into the monitor 2 as the contacts [RI] R1 and R2 of the relay 20 are in parallel connected with the start contacts 10a and 10b of the mouse 7 or the start contacts 10A and 10B of the scanner 6.

Since the input of the [DDC] display data channel 22 can be accomplished by operating the mouse 7 or the scanner 6, the contacts Rl and R2 of FIG. 5 are preferably connected to a selecting switch 25 in order to select [one of the] either the mouse 7 [and] or the scanner 6. That is, when a contact C of the selecting switch 25 is electrically connected to a contact Cl of the selecting switch 25, the contacts Rl and R2 of the relay 20 function as a click contact of the mouse 7. On the other hand, when the contact C of the selecting switch 25 is electrically connected to a contact C2 of the selecting switch 25, the contacts [RI] R1 and R2 of the relay 20 function as a reading contact of the

scanner 6.

When the [DDC] display data channel 22 is inputted into the monitor 2 in such a manner as described above, a low voltage signal is applied to the [zener] Zener diode 201 of the interfacing section 200 connected to [the DDC pin of the cable 5] display data channel 22 pin 9 via connector 14 to [turn-on the transistor 202-] turn-off transistor 202, turn-on LED 220 via switch 213, and supply an output signal to programmable logic controller 100 via switch 215. In the other words, when the contacts [RI] R1 and R2 of the relay 20 are electrically connected to each other so that the [DDC *is* inputted] display data channel 22 is input into the monitor 2, the low voltage signal [(about 1,5 volt)] (about 1.5 volts) is applied to the interfacing section 200 to turn-off the transistor 202, whereas when the contacts R1 and R2 of the relay 20 [is] are electrically released from each other so that the [DDC] display data channel 22 is not inputted into the monitor 2, a high voltage signal (about 5 [volt] volts) is applied to the interfacing section 200 to turn-on the transistor 202, turn-off LED 200, and drive the signal to ground via relay coil 211.

If the [DDC is inputted] display data channel 22 is input into the monitor 2 and the transistor 202 is turned-off, the first and second switch contacts 213 and [21S] 215 are held turned-on as the relay coil 211 [can be] is not magnetized. This is the reason that the contact switches 213 and 215 of the relay 210 of the interfacing section 200 are a relay in [a B contacting way] contact B which is held turned-on when the relay coil 211 is not magnetized and is [turned-of] turned-off when the relay coil 211 is magnetized.

If the [DDC is inputted] display data channel 22 is input into the monitor 2, which in turn [makes the] turns-off transistor 202 [to be turned-off, therefore], the light emitting diode 220 is

turned on as a closed circuit is formed in the interfacing section 200, in which the electric current is discharged at an earth by way of the light emitting diode 220 and the first contact switch 213. If the [DDC is not inputted] display data channel 22 is not input into the monitor 2 and [the transistor 202 is turnedoff,] transistor 202 is turned on, the light emitting diode 220 is turned off as the electric current is discharged at the earth by way of the coil of the relay 210 in the interfacing section 200 and the first contact switch 213 of the relay 210 is turned off. Accordingly, the worker [identified] identifies the light emitting diode 220 when transistor 202 is turned off to determine whether or not the [DDC is inputted] display data channel 22 is input into the monitor 2.

When the contacts R1 and R2 of the relay 20 are turned-on according to the control of the PLC 100 and the [DDC is normally inputted] display data channel 22 is normally input into the monitor 2, the PLC 100 analyzes the signal outputted from the interfacing section 200 [*so* as] to determine whether or not the [DDC] display data channel 22 is normally inputted into the monitor 2.

As shown in FIG. 4, switching times when the input of the [DDC] display data channel 22 is normal are different from that when the input of the [DDC] display data channel 22 is abnormal after the [DDC] display data channel 22 is inputted into the monitor 2. When the input of the [DDC] display data channel 22 is normal, the switching times between interface 200 and programmable logic controller 100 are in a range of approximately 750 milliseconds to approximately [1.2] 1.5 seconds, while when the input of the [DDC] display data channel 22 is abnormal, the switching times are in a range of approximately 3.5 seconds to approximately 4.5 seconds.

[Accordingly, the signal outputted from the interfacing section 200 is identified at a time, for

example 1.5 sec, that the switching times do not overlapped after the DDC is inputted into the monitor 2. If a high frequency signal is not outputted from the outputted signals and the same signal as that before the DDC is inputted into the monitor 2 is outputted, it is determined that the input of the DDC is normal, On the other hand, if the high frequency signal is outputted from the interfacing section 200, it is determined that the input of the DDC is abnormal.] Accordingly, the signal outputted from interfacing section 200 is identified at first and second times by programmable logic controller 100. If a high frequency signal is output from interfacing section 200 at the same frequency as the inputted predetermined electric signal 21 from programmable logic controller 100, the input of the display data channel 22 is normal. Otherwise, if the output signal from interfacing section 200 is at a lower frequency than the inputted predetermined electric signal, the input of the display data channel 22 is abnormal.

Embodiments of the present invention permit sequences of testing to be programmed into [PLC] programmable logic controller100. [PLC] programmable logic controller 100 is able to broadcast an alarm via loudspeaker 150 whenever it determines that an input of the [DDC] display data channel 22 is abnormal.

According to the principles of the present invention, the input and examination of the [DDC] display data channel 22 in manufacturing the monitors are automatically carried out so that it is unnecessary [that] for the input and examination of the [DDC are operated by the mouse 7 and the scanner 6 and] display data channel 22 to be operated by a mouse 7 and a scanner 6 when the monitor is identified by the worker after carrying out the input and examination of the [DDC] display data channel 22. As described in the foregoing paragraphs, the apparatus to input and detect the

[DDC] display data channel 22 in manufacturing the monitors according to the present invention is capable of improving a productivity of monitors by automatically inputting and detecting a display data channel of a monitor in manufacturing the monitors, thereby reducing a manufacturing cost of the monitor. The difference between the present invention and the conventional art and the advantages of the present invention will be apparent with reference to a table below.

<Table 1>

	conventional art		present invention	
	input of DDC	detecting of DDC	input of DDC	detecting of DDC
How to operate	manual operation by using a scanner or mouse		automatic operation by using a PLC	
identification of the operation	worker identifies the operation with [eyes] observation		worker identifies the operation with LED	
when errors are generated	Worker identifies messages of a monitor with [eyes] observation during the operation (impossible immediate response)		Alert by means of an alarm (possible immediate response)	
times for operation	about 5 sec	about 2 sec	0	

While the present invention has been particularly shown and described with reference to a particular embodiment thereof, it will be understood by those skilled in the art that various changes in form and detail may be effected therein without departing from the scope of the invention as defined by the appended claims. For example, although these principles have been illustrated for the manufacture of cathode ray type monitors, the present invention may be practiced during the test of any type of monitor, such as, by way of example, a flat panel display or a liquid crystal display.

ABSTRACT

An [apparatus and process] apparatus, process, and method for inputting and detecting a display data channel by which data relating to a monitor [are] is transmitted to a computer in manufacturing a monitor. The [apparatus according to the] present invention includes an input device which has an automatic signal supplying [element, for input] element for inputting the display data channel for the monitor in a facilities for manufacturing the monitor[,] ; a driving device for driving the inputting device by a predetermined electric signal[,] ; an interfacing section for outputting [the] a same voltage signal as an initial signal, which [si] is switched at a different time according to a result of the input to the display data channel[,] ; and a determining device for generating a predetermined electric signal to control the driving device and for analyzing an output signal from the interfacing section to determine whether or not the display data channel is normally input into the computer.